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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,402	08/06/2003	Edward S. Ahn	220318	1210

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EXAMINER	
SOROUSH, ALI	
ART UNIT	**PAPER NUMBER**
1616	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/26/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/635,402	AHN, EDWARD S.	
	Examiner	Art Unit	
	Ali Soroush	1616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date: _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I (claims 1-17) in reply filed 11/06/2006 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 5-7 and 12-17 rejected under 35 U.S.C. 102(e) as being anticipated by Tofighi et al. (US 6840961, Published 01/11/2005).

Tofighi et al. teaches, "The present invention provides bone substitute material implants having high compressive strength and uniform porosity." (See column 4, Lines 37-39). "In at least some embodiments, **an amorphous calcium phosphate is combined with at least one other calcium phosphate in the calcium phosphate precursor** of the bone substitute material implants of the invention." (See column 5, Lines 60-63). "**Suitable second calcium phosphates include**, but are not limited to, dicalcium phosphate, ... **tricalcium phosphate** ..." (See column 6, Lines 9-12). "The **calcium phosphate precursor** of the bone substitute material implants of the invention is made up of **very small particles**. In some embodiments, the particle size is less than

about 125 µm. In some embodiments, the particle size is between about 0.1 µm and about 125 µm. In some embodiments, the **particle size is between about 0.1 µm and about 50 µm**. The small particle size of the precursor corresponds to a high specific surface area ... For example, **the specific surface area of the precursor powder** can be between **50 m^2/g and about 100 m^2/g in the dry powder**, and between about 100 m^2/g and about 150 m^2/g after hydration ... The **small size of the particles of the precursor also contributes to the high density** and corresponding high strength of the bone substitute material implants of the invention as **densification is preformed more readily on smaller particles** ..." (See column 5, Lines 6-26). "... The dimension of crystal size ... of the invention can be about 26 nm in length and about 8 nm in width ... " (See column 6, Lines 48-50). Tofighi et al. further teaches, "Some **bone substitute material implants of the invention include biocompatible polymer** in the form of powder or fibers. Polymer powder functions as a binder, while polymer fibers serve as a binder and as reinforcements." (See column 7, Lines 51-54). " **Examples of suitable biocompatible and/or biodegradable polymers include**, without limitation, **polylactide, poly(lactide-co-glycolide)** ... Any biocompatible polymer known in the art can be used in implants of the invention." (See column, Lines 58-64). "Some **bone substitute material implants of the invention include** one or more **bone regenerative proteins** (BRPs) to accelerate bone growth and healing. Non-limiting examples of BRPs include transforming growth factor-β, cell attachment factors, endothelial growth factors, and **bone morphogenetic proteins** ... Some **bone substitute material implants of the invention include one or more antibiotics** to

control post-operative inflammation or infection." (See column 8, Lines 18-26). One example taught by Tofighi et al. is a dowel comprising amorphous calcium phosphate and dicalcium phosphate dihydrate including 4 wt % polylactide (See column 12, Table 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Applicant Claims
2. Determining the scope and contents of the prior art.
3. Ascertaining the differences between the prior art and the claims at issue; and resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalal et al. (US 6949251, Published 09/27/2005) in view of Ying et al. (US 6013591, Published 01/11/2000).

Applicant Claims

Applicant claims a composition comprising a densified particulate tricalcium phosphate having a particle size of 5 μm or less, an average crystal size of about 250 nm or less and a surface area of about 20 m^2/g or greater. The composition further comprises a secondary additive such as zirconia, polymers, proteins, nucleic acids, and/or a pharmaceutical in an amount of about 1% to 50% by volume.

Determination of the Scope and Content of the Prior Art (MPEP §2141.01)

Dalal et al. teaches, "**A composition comprising porous β-tricalcium phosphate (β-TCP)** granules that have a particle size of 0.1 –2 mm and that comprise a multiplicity of pores …" (See column 59, claim 1). "The composition of any one of claims 1 to 5, **further comprising a bioactive agent.**" (See column 59, claim 13). "The composition of claim 13, wherein the **bioactive agent is a bone morphogenic protein.**" (See column 59, claim 14). "The composition of claim 13, wherein the **bioactive agent is** an osteogenic **protein** …" (See column 59, claim 16). "The composition of claim 13, wherein the **bioactive agent is a nucleic acid molecule** comprising a sequence encoding a bone morphogenic protein." (See column 60, claim 19). "The composition of claim 13, wherein the bioactive agent is encapsulated in a biodegradeable agent." (See column 60, claim 20). "The composition of claim 20, wherein the **biodegradeable agent is selected from the group consisiting of … natural and synthetic callogen, … polygalactic acid, … poly (L-lactide)(PLLA), … polygylcolide, poly(lactcide-co-glycolide)(PLGA) … polyhydroxybutyrate (PHB)** …" (See column 60, claim 21). Dalal et al. in a specific example teaches a formulation

comprising β-TCP and 7% PLGA with 0.3% OP-1 (bone morphogenic protein). (See column 36, Table 3).

Ascertainment of the Difference Between Scope the Prior Art and the Claims (MPEP §2141.012)

Dalal et al. lacks a teaching of a particulate tricalcium phosphate of average particle size of about 5 μm or less, an average crystal size of about 250 nm or less and a surface area of about 20 m^2/g or greater. Further Dalal et al. lacks a teaching of a composition of particulate tricalcium phosphate with a secondary additive of zirconia. Ying et al. cure these deficiencies.

Finding of Prima Facie Obviousness Rational and Motivation (MPEP §2142-2143)

Ying et al. teaches, "A composition comprising particulate apatite having an average apatite **crystal size of less than 100 nm**, wherein the crystal is sphererical." (See column 36, claim 1). "A composition as in claim 1 wherein the **particulate apatite is densified**." (See column 36, claim 5). "The composition of claim 1 comprising **apatite having an average particle size of less than 0.5 μm**." (See column 35, claim 7). "The composition of claim 7 comprising **particulate apatite having a surface area of at least 100 m^2/g**." (See column 36, claim 10). In a particular example Ying et al. teaches, "Synthesis and characterization **of Hydroxyapatite-Zirconia composites**. A **composite including an apatite and a structural additive** was prepared, with the additive selected to enhance the mechanical properties." (See column 30, Lines 22-25). "Additionally, further reinforcement of the hydroxylapatite can be accomplished by

introducing a secondary dispersiod such as zirconia which would greatly improve the toughness and chemical stability of hydroxyapatite ... **A dense composite of nanocrystalline hydroxyapatite and 10 wt % of nanocrystalline 3 mol % Y_2O_3-doped ZrO_2** possessed an even higher compressive strength of 1020 Mpa." (See column 35, Lines 48-57). It would have been obvious to one skilled in the art at the time of the invention to use β-TCP with the same surface area, particle size, and crystal size characteristics as taught by Ying et al. for hydroxyapatite. The production of such a β-TCP would be possible because Ying et al. teaches that both tricalcium phosphate and hydroxyapatite are bioceramic materials. (See column 1, Lines 60-64). As such the method of producing a hydroxyapatite with the specific characteristics disclosed by Ying et al. could also be used to produce a TCP composition with similar characteristics. One would have been motivated to do this because "the success of bioceramic implants depends upon properties of strength, fatigue resistance, fracture toughness, and the like. These properties are reported to be a function of grain size and purity, but strength typically decreases as grain size increases." (See column 2, Lines 62-66). In regards to the aspect ratio of the metal oxide additive being 2 or greater, the additive of Ying et al. is the same as the instantly claimed invention and therefore the aspect ratio would be inherent. Products of identical chemical composition cannot have mutually exclusive properties. A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. For the foregoing reasons the instantly claimed invention would have been obvious to one of ordinary skill in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ali Soroush whose telephone number is (571) 272-9925. The examiner can normally be reached on Monday through Thursday 8:30am to 5:00pm E.S.T.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on (571) 272-0646. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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